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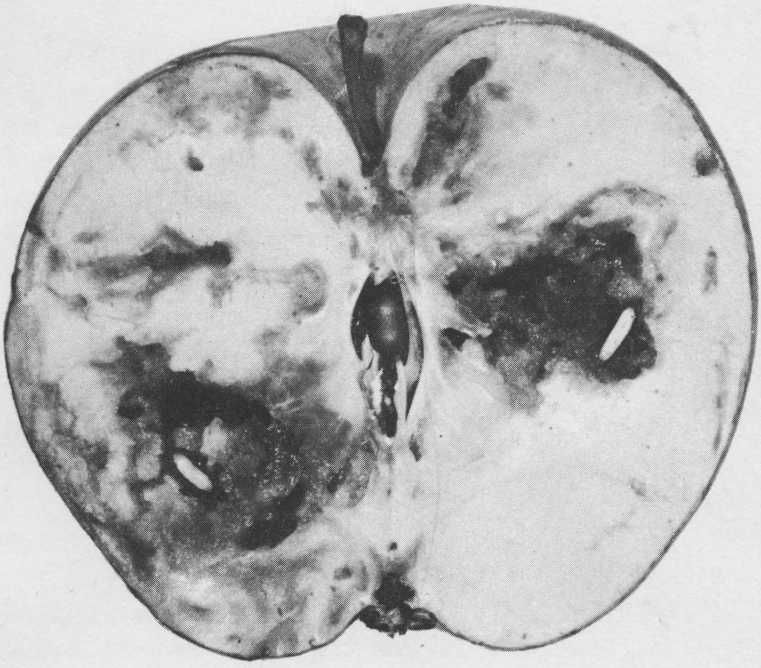

# APPLE MAGGOT CONTROL

## IN WESTERN NEW YORK

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**OF THE SEVERAL HUNDRED** insect and mite species that are known to feed on apple in the northeastern part of the United States, the apple maggot, *Rhagoletis pomonella,* has been and continues to be one of the most dangerous enemies of the commercial as well as the home apple grower. Fruits in unsprayed or poorly sprayed orchards are regularly riddled and made worthless by the maggot injury. Currently, the only known method of preventing maggot damage is through the regular application of residual type insecticides during the period when the flies are active in the orchard.

The apple maggot overwinters as pupae in the soil and in Western New York flies emerge from late June through early September. Peak emergence occurs during the latter half of July. Protection against attack by apple maggot flies is needed in normal commercial apple plantings during a 6-8 week period from late June or early July through late August. In exceptional situations, where flies migrate from nearby unsprayed trees, protection may be required into September.

## PROCEDURE

Apple maggot control experiments are difficult to conduct because rapid movement of flies from tree to tree renders the small plot technique ineffective for evaluating many control agents and programs. Further-

more, since commercial growers cannot tolerate maggot in their crop, adequate infestations for test purposes are found only in abandoned orchards or in isolated trees. Neither of these situations is satisfactory for field experimentation. Therefore, when the writer located a 15 acre abandoned, but reasonably vigorous apple orchard which was heavily infested with maggot, it was decided to conduct field tests in 1965 to evaluate various insecticides for control. This orchard is on the Marks Farm in Greece Township.

The major part of the orchard consisted of medium size apple trees mostly of Cortland, Red Delicious, Golden Delicious, and Rhode Island Greening varieties. There were also a few small Macoun apple trees between the main orchard and the woods. The orchard and the experimental plot arrangement are shown in Figure 1. Each of Plots 1 to 6 consisted of approximately 1 acre and were used to compare recommended spray programs. Plots 7 to 12 were on single Macoun trees, replicated three times, and used to evaluate new materials. It should be noted that extensive areas of unsprayed check trees were present on the east, south, and north sides of the test block. Furthermore, there were numerous unsprayed trees west of the wooded area. Therefore, the plots were not only subject to attack by flies emerging within each plot, but also by those that may have migrated from the untreated areas.

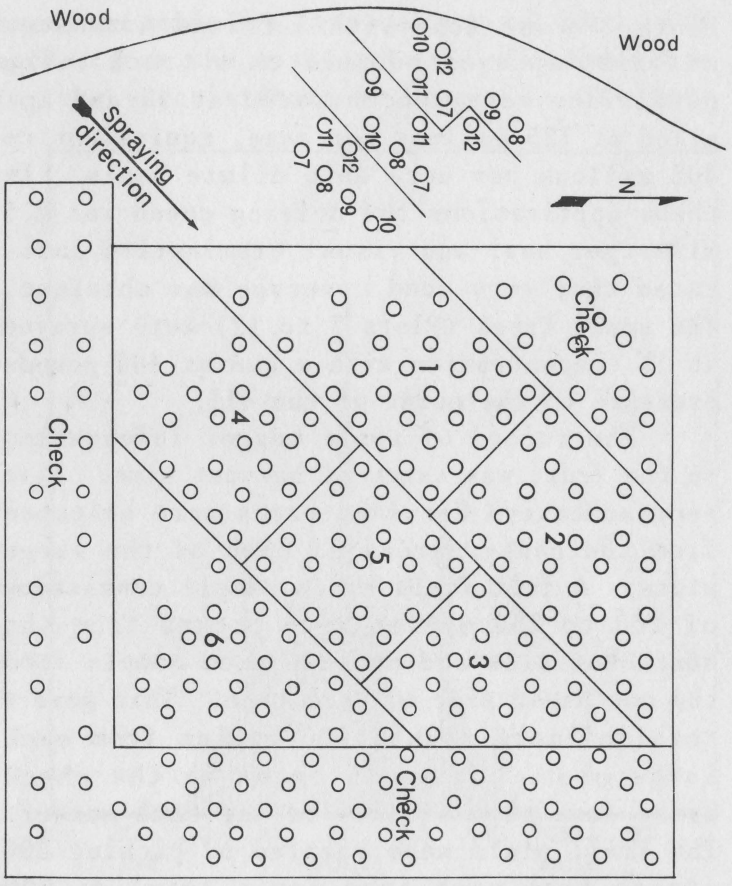


*Figure 1.--Experimental plot arrangement of 1965 apple maggot test, Marks Farm, Greece, New York.*

No insecticides or fungicides had been applied in the test orchard during the 1963 and 1964 seasons. Because of a dry spring, apple scab infection was light in early 1965, and dodine applied in all but the first test spray prevented further spread. Spraying of

Plots 1-6 was done with a Friend Airmaster airblast sprayer mounted on a truck. The pesticides were concentrated at 3X and applied at 135 gallons per acre, equivalent to 405 gallons per acre on a dilute basis. In these applications the driving speed was 2.5 miles per hour and visual examination indicated that very good coverage was obtained. The small trees (Plots 7 to 12) were sprayed at 1X concentration with a gun at 400 pounds pressure to the point of run-off.

The record of apple maggot infestation in the fruit was taken at harvest time. Five representative Cortland trees were selected from the center areas of each of the large plots. A full field crate sample consisting of 200 to 250 apples were picked from the southwest side and another such sample from the northeast side of each tree. This gave a total of more than 1,000 apples from each large plot. Suitable trees in the check areas were also sampled in the same manner. The small plots were sampled by picking 200 apples from each tree for a total of 600 apples per treatment. All apples were carefully examined for oviposition punctures. Any apple maggot injured or suspicious appearing fruit were cut open to determine whether it was wormy.

The timing of the experimental spray treatments was based on emergence trends in cages and observations made in the orchard during the season. As a basis for this timing, emergence cages were placed over

seedings made in late summer of 1964 with apples from the test orchard. The emergence for the year is shown in Figure 2. The pat-

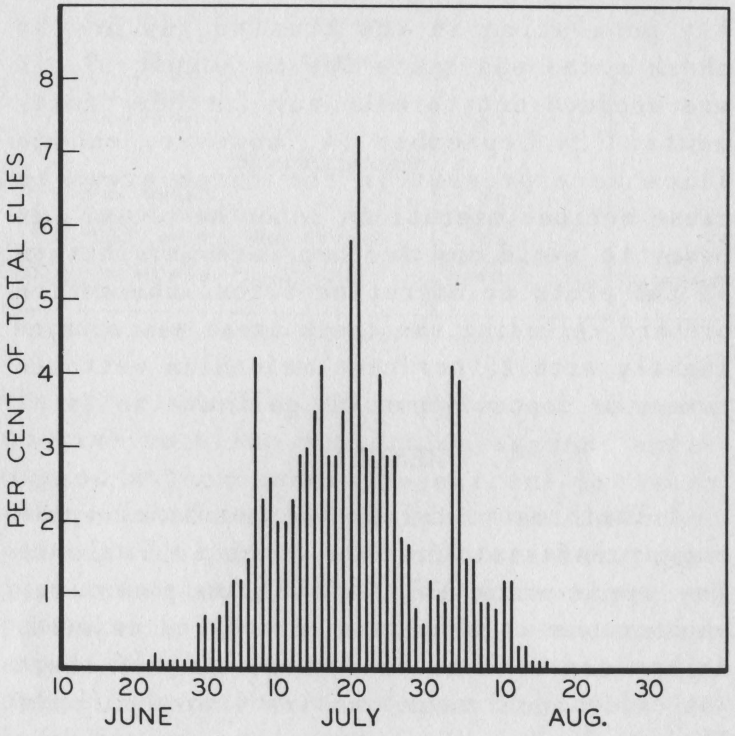


*Figure 2.--Apple maggot fly emergence, 1965.*

tern is quite typical for Western New York in that emergence began in late June, was heaviest in July and tapered off sharply in August. It was atypical in that there was no emergence during the latter half of August and early September. The first treatment was made on July 1 just 9 days after the first

fly was taken. The subsequent three sprays were applied at approximately 2 week intervals with the last application on August 11. Because careful observations showed that the fly population in the treated and nearby check areas was quite low on August 19, it was decided not to make any further treatments. By September 14, however, enough flies were present in the check areas to cause serious migrations into the plots. In order to avoid any further late infestation of the plots by migrating flies, the entire orchard including the check areas was sprayed lightly with 25 per cent malathion wettable powder at 2 pounds per 100 gallons.

## RESULTS

The treatments and the resulting apple maggot infestations are given in Table 1. Any apple with an oviposition puncture, whether one or more, was considered injured. An apple was considered wormy only if there was evidence of maggot activity in the flesh. The checks for the large plots ranged from 63 per cent to 100 per cent wormy and averaged 83 per cent. The checks for the small plots (7-11) were less heavily infested by maggot, a situation which was judged to be due to a difference in varietal susceptability. For example, fruits on a Red Delicious tree were 100 per cent infested, whereas those on an adjacent Macoun tree were only 43 per cent infested.

Results for Plots 1 to 6 indicate that

Table 1. Apple Maggot Control, Marks Farm, Greece, New York, 1965

| Plot | Material and rate per 100 gallons | % of fruit Injured | % of fruit Wormy | % reduction of the number of punctures |
|---|---|---|---|---|
| | **Large, unreplicated plots** | | | |
| 1 | 1 lb. 25% Guthion | 14.4 | 6.3 | 97.8 |
| 2 | 2 lbs. 50% DDT / 2 lbs. lead arsenate | 7.1 | 2.0 | 98.8 |
| 3 | 2 lbs. 50% Sevin | 3.9 | 0.4 | 99.3 |
| 4 | 1 lb. 50% Sevin / 0.5 lb. 25% Guthion | 9.3 | 1.2 | 98.6 |
| 5 | 8 fl. oz. 8#-g. Delnav[1] | 3.8 | 0.9 | 99.3 |
| 6 | 1 lb. 50% Imidan | 8.4 | 2.3 | 98.3 |
| - | Unsprayed checks | 83.2 | 83.2 | (7.3/a.) |
| | **Small, replicated plots** | | | |
| 7 | 2 lbs. 50% Banol | 2.8 | 0.3 | |
| 8 | 1.25 lbs. 40% GS 13005 | 5.1 | 0.2 | |
| 9 | 21.3 fl. oz. 3#/g. Zolone (RP 11974) | 28.6 | 1.6 | |
| 10 | 1 lb. 75% SD 8447 | 7.0 | 3.0 | |
| 11 | 1 lb. 50% Imidan | 4.4 | 0.3 | |
| - | Unsprayed checks | 35.6 | 35.6 | |

[1] Ring injury on 20% of fruits on Golden Delicious and Cortland varieties.

the spray schedule employed was not adequate to give complete protection against apple maggot attack under the extreme pressure that existed in this orchard. On the other hand, it is evident that all treatments gave good reductions (97.8-99.3%) in the number of punctures. It would seem safe to assume that any of the treatments would have been adequate in normal orchard situations with low infestations and without nearby, heavily infested orchards.

These data seem to indicate that some treatments in the large plots were superior to others, but without replications, it is impossible to be certain. It is the writer's opinion that the differences are within the expected experimental variations and, therefore, these data do not warrant the interpretation that any one treatment is inferior to another. There is some reason to believe

that fly migration was greater to some plots than to others. For example, Plot 5 was surrounded by sprayed trees and Plot 2 was similarly surrounded except on the north side. Less fly migration into these plots would have been expected.

The situation in Plots 7 to 11 is interesting from an experimental nature. Single tree plots have not been considered practical in the past. Data obtained in this instance, however, suggest that some very useful information can be gathered with single tree plots. All treatments provided good reductions in the number of wormy fruits and all but Zolone (RP11974) gave considerable reduction in the number of oviposition injuries. It is not known whether Zolone prevented oviposition, was ovicidal, or larvicidal. Because there was so little breakdown of the tissue around the punctures in this treatment, it appears likely that the eggs, if present at all, failed to hatch.

## CONCLUSIONS

1965 data on apple maggot control presented here suggest that the recommended control programs of Guthion, DDT plus lead arsenate, Sevin, and a mixture of Sevin and Guthion provided good control of apple maggot. Delnav and Imidan also gave good control. The four-spray program used appears adequate for normal commercial Western New York orchards, but should be supplemented for difficult control situations.

Several new experimental insecticides showed promise in small plot tests.


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